The Refrigeration Service Engineer

Vol. 3
No. 12

DECEMBER • 1935

Copeland Commercial Equipment • Questions and Answers • Air Conditioning for Small Stores and Homes • Multiple Market Installations

8 REASONS WHY SERVICE ENGINEERS PREFER LARKIN COILS

NEW *Sensational* · FEATURE · *STAGGERED* TUBING ✓

NEW INRFIN (*Internal Fin*) *Construction* ✓

All Joints SILVER *Soldered* ✓

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Increased LINES 756 MODELS ✓

3 CONVENIENT FACTORIES ✓

7. The LARKIN line now offers 756 regular models of coils over a previous 124. In addition, to meet various demands and circumstances, we now offer three new separate and distinct lines:

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LARKIN features of staggered tubing, Inrfin, imbedded fin-to-tube contact, guaranteed silver soldered bond and continuous fin are embodied in all three Larkin Lines.

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LARKIN

REFRIGERATING CORPORATION

CHICAGO FACTORY

GENERAL OFFICES & FACTORY ATLANTA

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SUBJECT INDEX

January to December, 1935 **Volume Three**

TO facilitate the location of articles which have appeared in THE REFRIGERATION SERVICE ENGINEER, this index will be a regular feature in each December issue, serving as a ready reference of the articles and subject matter which have appeared in the preceding twelve issues.

The figure following the date of issue refers to the page on which the article will be found.

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The REFRIGERATION SERVICE ENGINEER

Devoted to the Servicing of
REFRIGERATION UNITS *and* OIL BURNERS

VOL. 3. DECEMBER, 1935 NO. 12

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COVER

RADIO, as a manufacturing tool in the production of electric refrigerators, seems a far cry from radio as we know it as a medium for entertainment. Yet, that is just what the Crosley Radio Corporation uses this radio receiving set for. It's on the old principle that when you get beyond one set of laws, a new set steps in. Tolerances between the moving parts of Crosley rotary compressors have been reduced to such a fine point that micrometers as measuring instruments are relatively crude. In order to determine whether the cylinder of the rotary compressor is properly centered and whether there are any microscopic irregularities in the concentricity of the cylinder with the eccentric stud, this radio receiving set with headphones is used.

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The Refrigeration Service Engineer

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

OFFICIAL ORGAN REFRIGERATION SERVICE ENGINEERS' SOCIETY

VOL. 3, NO. 12 CHICAGO, DECEMBER, 1935 $2.00 per Annum

Installing and Servicing Copeland Commercial Equipment

Practical suggestions on the selection, installation and servicing of Copeland units. Specifications and description of various parts.

THE Copeland commercial refrigerating unit is one of the better-known makes. This condensing unit is manufactured by the Copeland Refrigeration Corporation of Detroit, Mich., and its first machines were placed on the market in 1918.

The compressors are of the conventional multi-cylinder reciprocating type, using either methyl chloride or sulphur dioxide, in capacities from ¼-hp. up to 5-hp. Specifications for the current methyl chloride units are as follows:

The following pointers on the selection of the right type of condensing units for particular applications and the installation suggestions are suggested by the Copeland Refrigeration Corp.

In any type of commercial application, the success or failure in performance of the system depends upon the following conditions:

1. A system of the proper capacity for the work demanded of it.

2. The correct installation of the condensing and cooling units.

SPECIFICATIONS FOR CURRENT COPELAND METHYL UNITS

Model	No. of Cylinders	Hp.	Cooling Medium	Bore and Stroke	Compressor r.p.m.	CH_3CL Charge	Receiver Capacity
M	2	¼	Air	1⅜"x1⅜"	650	2 lbs.	2½ lbs.
P	2	½	Air	1½"x1½"	440	5 lbs.	30 lbs.
PW	2	½	Water	1½"x1½"	440	5 lbs.	18 lbs.
R	2	½	Air	2 "x1½"	440	5 lbs.	20 lbs.
RW	2	½	Water	2 "x1½"	440	5 lbs.	18 lbs.
SA	2	¾	Air	2 "x1½"	640	5 lbs.	20 lbs.
W	2	¾	Water	2¼"x3 "	250	5 lbs.	28 lbs.
WA	2	1	Air	2¼"x3 "	250	5 lbs.	20 lbs.
X	2	1	Water	2¼"x3 "	365	5 lbs.	25 lbs.
XA	2	1½	Air	2¼"x3 "	365	5 lbs.	20 lbs.
Y	2	1½	Water	2¼"x3 "	500	5 lbs.	25 lbs.
Y	3	2	Water	2¼"x4 "	365	10 lbs.	35 lbs.
Z	3	3	Water	2¼"x4 "	500	10 lbs.	35 lbs.
AZ	3	5	Water	2½"x4 "	540	10 lbs	35 lbs.

Methyl chloride units are identified by the orange base, while sulphur dioxide units have a green base.

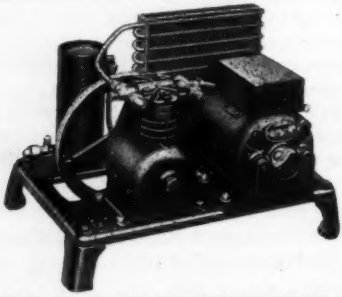
3. Good insulation of the proper thickness at all points where the entrance of heat is to be retarded.

SPECIFICATIONS FOR COPELAND SO_2 UNITS
This equipment has the same general specifications as the corresponding methyl chloride models.

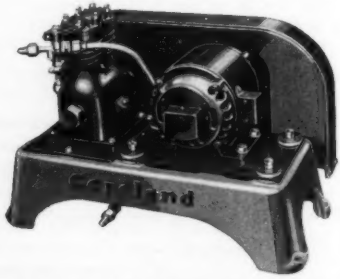
Model	Hp.	Cooling Medium	Bore and Stroke	Comp. R.P.M.	SO_2 Charge	Receiver Capacity
P-S	⅓	Air	1½"x1½"	575	7 lbs.	30 lbs.
PW-S	⅓	Water	1½"x1½"	575	7 lbs.	27 lbs.
R-S	½	Air	2 "x1½"	575	7 lbs.	30 lbs.
RW-S	½	Water	2 "x1½"	575	7 lbs.	27 lbs.
W-S	¾	Water	2¼"x3 "	365	10 lbs.	42 lbs.
WA-S	1	Air	2¼"x3 "	365	10 lbs.	30 lbs.
X-S	1	Water	2¼"x3 "	500	10 lbs.	38 lbs.
XA-S	1½	Air	2¼"x3 "	500	10 lbs.	30 lbs.
Y-S	2	Water	2¼"x3 "	500	10 lbs.	53 lbs.

SPECIFICATIONS OF THE COPELAND MODEL R COMMERCIAL CONDENSING UNIT

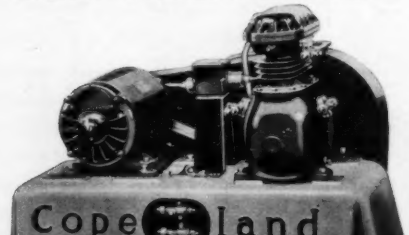
COMPRESSOR—Two cylinder. Vertical, reciprocating, single acting.
BORE—2 inch.
STROKE—1½ inch.
SPEED—440 R.P.M.
CYLINDER—Cylinder and crankcase cast integral of semi-steel.
CRANKSHAFT—Drop forged carbon steel. Heat treated, hardened and ground to size. Thrust on crankshaft is taken on a steel ball.
CONNECTING ROD—Drop forged. Spun babbitt connecting rod bearing and bronze wrist pin bushing.
MAIN BEARINGS—Diamond bored in the cylinder block casting.
PISTON—Cast iron. Equipped with two piston rings.
DISCHARGE VALVE—Reed type; provided with secondary lift for high pressure relief.
SUCTION VALVE—Disc type. Enclosed in the piston head.
SEAL—Balanced bellows type. The sealing ring is pressed against the face on the crankshaft by a compression spring.
DRIVE—Single "V" type belt.
A.C. MOTOR—½-hp., 110-220 volts, repulsion-induction, single phase, 60 cycle, furnished as standard equipment. Other voltages, phases and cycles, may be furnished as required.
D.C. MOTOR—Compound wound. 110 or 220 volt. Other voltages may be furnished as required.
CONDENSER—Water cooled. Single row water coil in the receiver shell.
RECEIVER—Drum type. Located underneath the condensing unit base.
REFRIGERANT—Charged with five pounds of methyl chloride.
OIL—1¾ pints of Special Copeland Compressor Oil.
MOTOR CONTROL—Low pressure control with a high pressure cut-out or temperature control with high pressure cut-out.
GUARD—Made of sheet metal. Placed over the fan and compressor pulleys.
MOUNTING—Base is made of heavy cast iron.
DIMENSIONS—28¼" long x 14¾" wide x 18⅝" high.



MODEL M—¼ HP. AIR COOLED COPELAND



MODEL PW—⅓ HP. WATER COOLED COPELAND



MODEL Y—2 HP. WATER COOLED COPELAND

4. Whether the system is to be installed in a refrigerator cabinet, display case or freezer case of any type, the construction and location of the baffles is of vital importance for successful operation.

5. The size of the opening and location of the warm and cold air ducts determine the efficiency of the cooling unit.

6. The general design of the interior of the cabinet should allow for free and rapid circulation of air through the food cham-

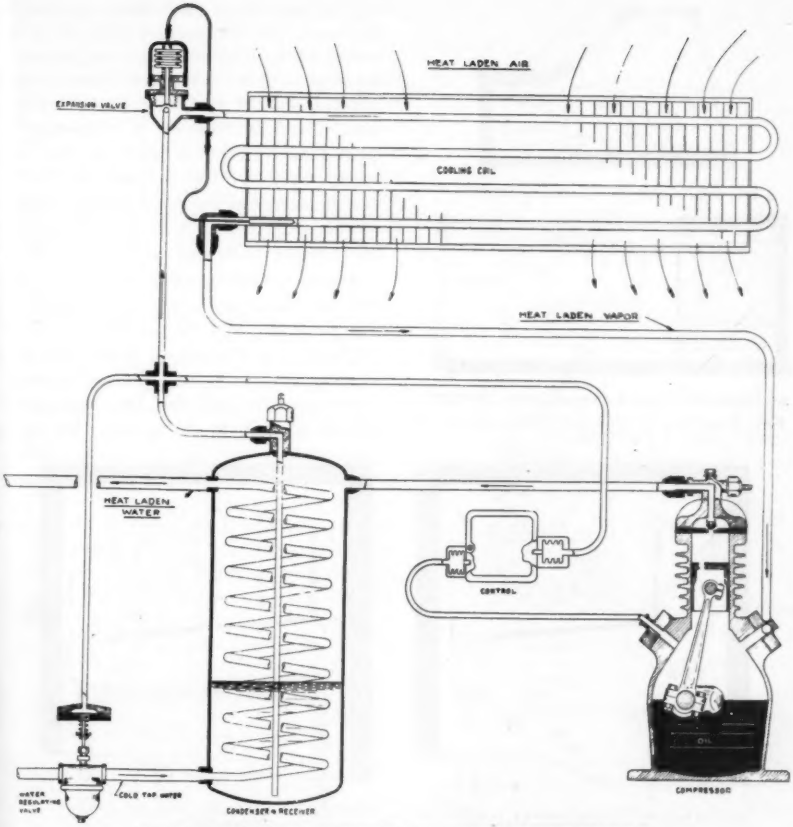


FIG. 1—COPELAND COMMERCIAL CYCLE OF OPERATION

ber and over the cooling unit to facilitate the transfer of heat from the foodstuffs to the cooling unit.

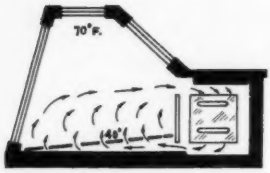
In Fig. 1 is illustrated the Copeland commercial refrigeration cycle.

Air Circulation

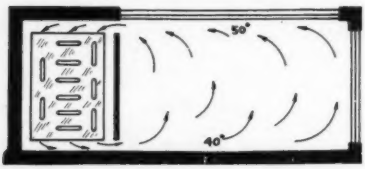
Air circulation is created by dividing the refrigerator into two compartments by means of an insulated partition, arranging the warm and the cold air duct for the exchange of air, and establishing a difference in temperature between the two sections. We are already familiar with their names. The bunker, or cooling chamber, contains the coils where the refrigerant is vaporized and is always above or at the side of the food storage space.

In Fig. 2 is illustrated the top display counter, showing the result that occurs in the placing of a cooling coil in a relatively low position. This accounts for the poor circulation of air and proper temperatures can only be expected to be obtained along the bottom surface. The temperature in the top of the case may equal room temperature. This matter of air circulation in commercial equipment has often meant the difference between the successful operation of a job and its unsuccessful operation.

We find that in market cooler jobs, for example, the poor circulation may be due to



AIR CIRCULATION IN TOP DISPLAY COUNTER



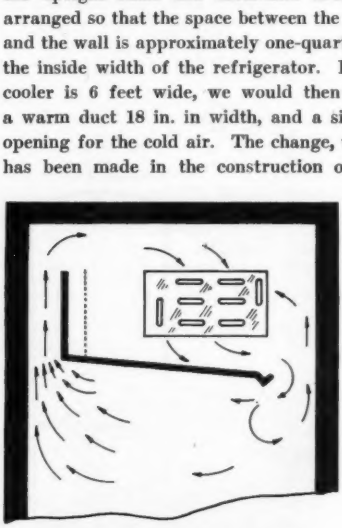
AIR CIRCULATION IN SINGLE BUNKER DISPLAY COUNTER

FIG. 2—AIR CIRCULATION IN COUNTER EQUIPMENT

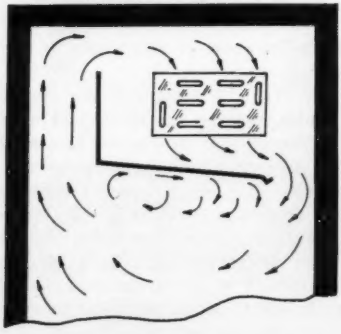
flues of inadequate size. When such may be the case, the temperature differential becomes higher than necessary, and the movement of air is retarded by the narrow space through which it must move. A general rule, which may be followed in estimating the proper air circulation space, is the "one-sixth" formula. This is based on the following method of determining proper spaces.

Referring to Fig. 3, it will be seen that the upright baffle and horizontal deck are arranged so that the space between the baffle and the wall is approximately one-quarter of the inside width of the refrigerator. If the cooler is 6 feet wide, we would then have a warm duct 18 in. in width, and a similar opening for the cold air. The change, which has been made in the construction of the

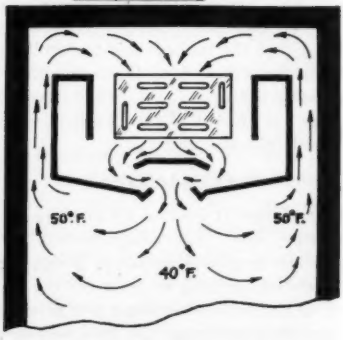
AIR CIRCULATION "L" TYPE MARKET COOLER



EFFECT OF NARROW WARM-AIR DUCT ON CIRCULATION



EFFECT OF UNINSULATED BAFFLE ON AIR CIRCULATION



AIR CIRCULATION "U" TYPE MARKET COOLER

FIG. 3—BAFFLE ARRANGEMENT IN MARKET COOLERS

baffle, is illustrated by the dotted line in Fig. 8.

In Fig 4 is graphically illustrated the advantages of the U-type bunker arrangement as compared to the L, or single cycle arrangement. It is suggested that while the U-type of bunker arrangement has a somewhat higher efficiency than the L-type, the improvement will hardly justify the additional work and expense involved, except in coolers of more than 6 feet in width.

Change Overs

A large number of owners of cabinets designed for the use of ice refrigeration will change over to mechanical refrigeration and, of course, the installation man is required to make the necessary changes in the cooler to adapt it to coils. It will be found that quite often the deck or horizontal baffle is slotted, providing a multiple down draft. This must be removed and replaced with the conventional set of baffles illustrated in the accompanying diagram. If it is found that there are heavy beams extending across the cooler and limiting the head room, they may also be taken out unless such beams are used to support cuts of meats. The baffles will be

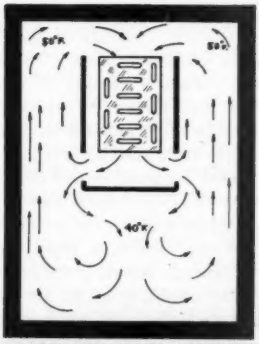


FIG. 4—U TYPE BUNKER ARRANGEMENT

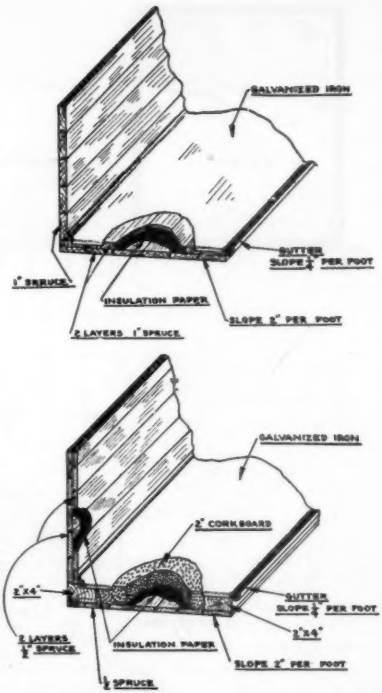


FIG. 5—DECK CONSTRUCTION

found to not need a support of that strength. It is possible that there may be no vertical baffles at all—just a slotted support or fence. These must either be replaced entirely with solid ones, or covered with at least one layer of 1 in. tongue and groove maple or spruce lumber. The back or rear wall of the refrigerator should be closed up entirely, and no attempt made to use it as a warm air duct. The construction of the deck is of considerable importance, and as a suggestion, two approved forms are illustrated in Fig. 5, although there are many others that will give equally satisfactory results. It must be remembered that all lumber must be odorless —spruce and maple being considered most satisfactory for this work. All wood should be given one or two coats of clear shellac (not paint) to make it waterproof, which should be applied and allowed to dry before placing in the refrigerator. No less than 2

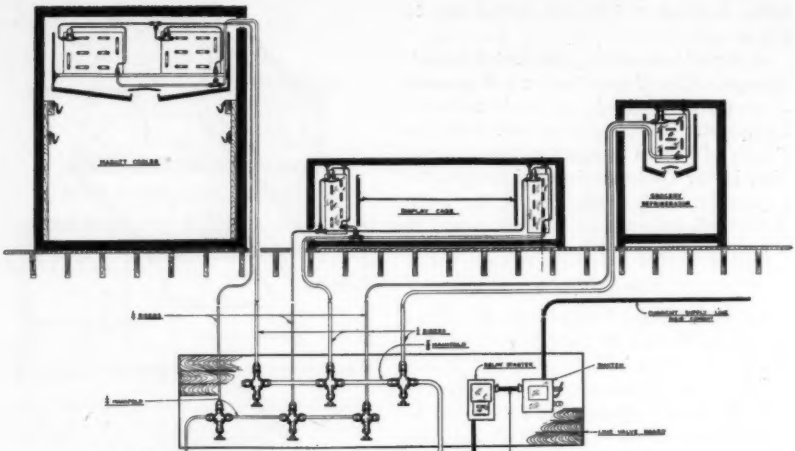


FIG. 6—MULTIPLE MARKET INSTALLATION

in. of wood or corkboard can be used on horizontal baffles with good results.

Installation of a Multiple Market Job

In Fig. 6 is a typical illustration of a market installation. In taking into consideration the location of the condensing unit in the basement, the following points should be considered:

1. Source of current supply.
2. Location of water supply and drain (if water-cooled unit).
3. Room temperature and ventilation (if air-cooled unit).
4. Accessibility.
5. Location of low-side.
6. Economy of material—tubing, wiring, plumbing, etc.
7. Ease of connecting liquid receiver discharge vent to the outside atmosphere.
8. Possibility of damage by water or market supplies.

When it is necessary to install the unit on the first floor, it should be done so that its position will not be higher than the low-side coils. While a number of condensing units have been placed on top of refrigerators or on the floor above with no difficulty experienced, such installations can not be recommended because of the possibility of compressor oil being carried over to the coils and trapped by the force of gravity. If the unit is of the air-cooled type, great care should be taken in selecting the proper place for it. The efficiency of an air-cooled job rises very appreciably as the room temperature is lowered, and since the increase in efficiency means a saving in actual money every month, it will pay to run a little extra tubing and place the unit where it can do the best work. Air-cooled units on the average operate at 10 to 15% higher efficiency when placed in a 70° location over a 100° location. Where the unit is placed in a small room which may be totally enclosed and the temperature be abnormal during the hot weather

months, suitable ventilation, be it by natural or artificial means, must be provided.

In proceeding with the installation, the manifold board should be mounted on the wall just above or to one side of the condensing unit. This, of course, is not necessary when the wall is simply a wooden partition, for the valves and other devices can easily be mounted on it. If, however, the wall is of brick, stone or concrete, drill several holes at least 3 in. deep with a star drill in such a way that they can be plugged with wood and serve as points of support for the valve board. If it is hollow tile, toggle bolts will serve the purpose. For small commercial jobs, a single board 8 or 10 in. wide and about 5 ft. long will be satisfactory. It may be mounted directly on the wall with not less than three points of support. See Fig. 7.

In proceeding with the layout of the tubing, we refer to Fig. 8. Never form a bend by hand to make a sharp change of direction as in putting it through the tubing hole of a cabinet. An elbow has the neatest appearance of all, but as it increases the number of operations, the use of a bending tool is recommended. In drilling through porcelain linings, they can be pierced by first drilling a ¼ in. hole with a twist drill, and then enlarging this with a reamer to one inch. If it is desired to flare tubing before feeding it through the hole, ream to 1¼ in. diameter.

Suction and liquid lines should always be protected by some suitable covering whenever their position is such that injury could be caused by crushing. Although tubing can usually be run along the side of one joist to the wall, and then across them to the condensing unit, it is sometimes unavoidable that the tubing be placed at right angles to the joist over the passageway or other place of activity. The hazard can be minimized by attaching strips of wood on both sides of the tubing as shown in Fig. 9. It is well to mention here that the service engineer be thoroughly familiar with all of the municipal ordinances governing the installation requirements.

Line Connections

The water regulating valve is connected to the lower or inlet opening of the condenser,

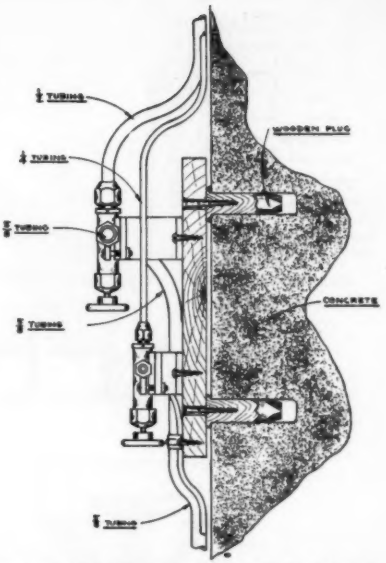


FIG. 7—SUGGESTED METHOD OF MOUNTING MANIFOLD BOARD TO CONCRETE WALL

Fig. 6, by means of a ⅜ in. pipe nipple of sufficient length to bring the valve clear of the unit mounting. The arrow on the valve indicates the direction of the flow of the water through the valve. Water lines may be of ⅜ in. galvanized pipe or ½ in. tubing. Tubing is preferred by some service engineers because it can be installed in less time and does not require pipe threading equipment. Rigid pipe lines require at least one union near the water valve so that it can be removed readily without disturbing the line to any great extent. Some vibration of the

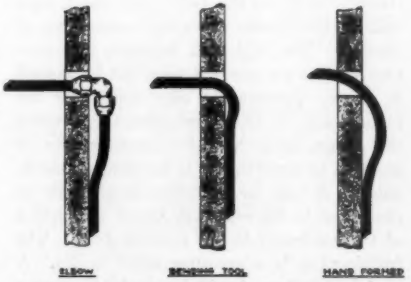


FIG. 8—EXAMPLES OF TUBE BENDING

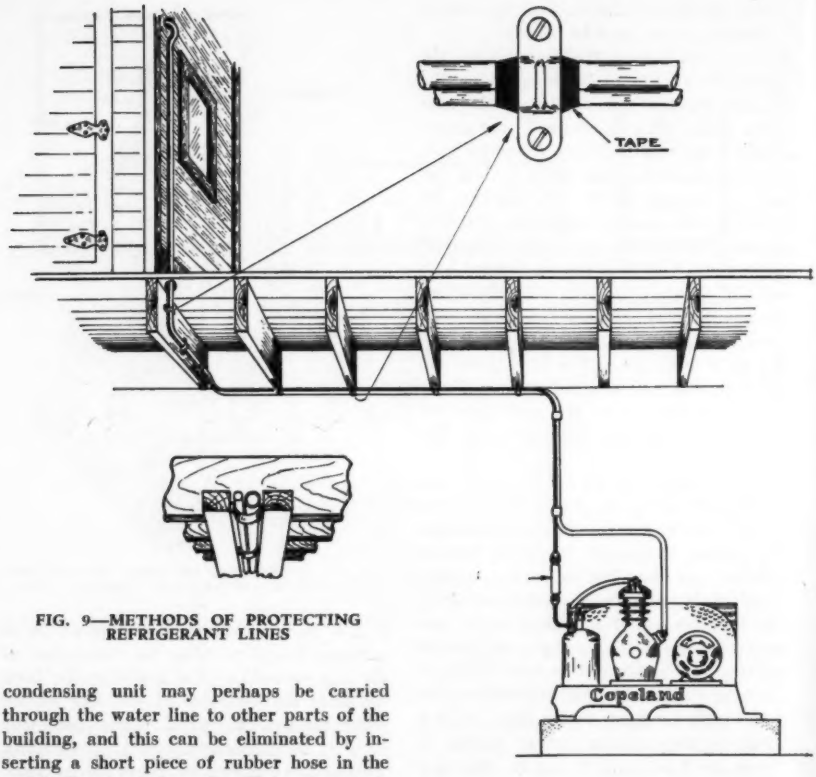


FIG. 9—METHODS OF PROTECTING REFRIGERANT LINES

condensing unit may perhaps be carried through the water line to other parts of the building, and this can be eliminated by inserting a short piece of rubber hose in the supply line near the unit. The water regulation valve is next connected to the high-side by a ¼ in. line run from the liquid receiver. Never connect the water valve to the compressor head through the service port in valve B, Fig. 6. The pressure at that point has very distinct pulsations, which would shorten the life of the water valve diaphragm and possibly cause the valve mechanism to chatter. The high-side between the compressor and the receiver must not be tapped to supply pressure to any device for the piston surge is very pronounced. In using the gauge, keep the valve closed as far as possible, to avoid injury to the delicate mechanism. A tube or pipe line should now be connected to the outlet or upper connection of the condenser to the nearest drain. The fusible plug is a pressure relief device. A vent connection should be made to convey the escaping refrigerant to the outside air. A short section of rubber hose is clamped to the fusible plug as illustrated in Fig. 11, and the other end attached to a length of ½ in. tubing. This according to Code must lead to a point outside the building with certain requirements as to its location to entrances, distance above ground, etc.

If the refrigerators are of a newer type design for either electrical refrigeration or ice, provisions have likely been made for the support of cooling coils. If not, cross pieces of ¾ in. galvanized pipe should be placed in the cooling compartment at the proper height to hold the coils in their correct relative position. These pipes are slightly shorter than the width of the bunker and may be fastened to the side by pipe flanges or by V-shaped pieces of wood. Small coils

in the grocery refrigerator display counter do not require as substantial support as those used in the market cooler. Again we suggest that the position of the coils in the cooling compartment is a matter of great importance in the successful operation of the machine, and air circulation diagrams in Fig. 3, 4 and 5 should be studied. A grocery refrigerator may have vertical air baffles of a slotted type instead of plain ones that have a tendency to force all of the air over the top edge. If so, they will have to be covered with sheets of galvanized iron to prevent the air from entering the coil chamber at the sides. This type of cooler may have been satisfactory enough for ice, but will not operate at highest efficiency for mechanical refrigeration.

Testing for Leaks

When all tubing is in place and flares are absolutely tight, test both the suction and liquid lines with compressed air or carbon dioxide vapor. Never use oxygen!

The ¼ in. liquid line is removed from the shut-off valve of the liquid receiver and attached to the upper compressor shut-off valve, known commonly as a B valve. The stem of the suction or A valve is turned in to close the suction line. The ⅛ in. brass plug is removed from the service port to admit air, and all line valves are opened to permit the air to flow to all parts of the system. Multiple expansion valves, when warm, will admit air or refrigerant to a pressure of about 40 lbs. so this amount will build up in the entire low-side while a high-side pressure from 150 to 175 lbs. is being developed by the compressor. The unit should then be stopped, or sooner if it indicates any signs of laboring. Never use air to test a system for leaks when the cooling coils are cold, as condensation of moisture in the evaporating coils will form. Testing in the above manner has one disadvantage. The pressure in the suction or low-side of the system is only about 40 lbs. and leaks are easier to detect when higher pressures are applied. A higher pressure can be built up by having a by-pass connection between the liquid and suction lines, or by removing the refrigerant, pumping the condenser and liquid receiver full of air, and then letting some of

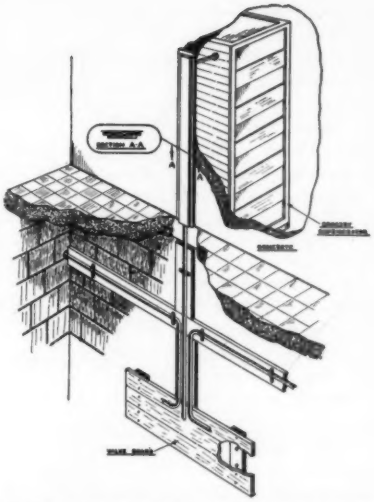


Fig. 10—Larger Installations having a great number of line valves present a much better appearance if the valves are secured to several boards like the type illustrated.

this air flow through the evacuating valve D, Fig 12, to equalize the pressure in both sides of the system. This evacuating valve only serves as a by-pass while removing the refrigerant, or after it has been taken out. It is used to equalize high and low-side pressures when testing with air for leaks. The liquid receiver is then entirely empty, the refrigerant having been taken out and the ¼ in. liquid line is left attached to the liquid receiver instead of moving it to the compressor head as was found necessary when the unit is fully charged. When the condensing unit is charged with the proper

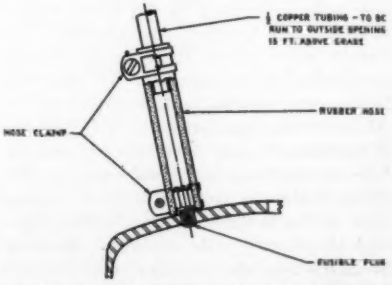
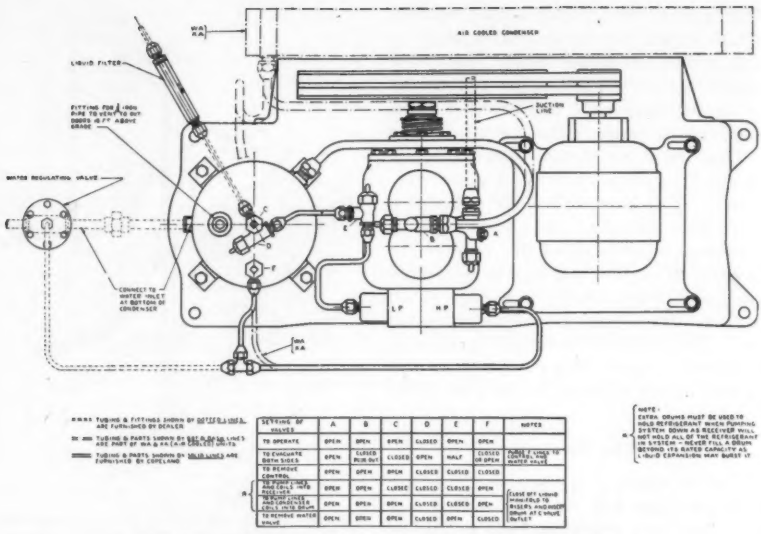


FIG. 11—VENT CONNECTION DIAGRAM



SETTING OF VALVES	A	B	C	D	E	F	NOTES
TO OPERATE	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	
TO EVACUATE BOTH SIDES	OPEN	CLOSED PLUG OUT	CLOSED	OPEN	HALF	CLOSED OR OPEN	PLUG 1/4" TEE TO WATER VALVE
TO REMOVE CONTROL	OPEN	OPEN	OPEN	CLOSED	CLOSED	CLOSED	
TO EVACUATE HIGH SIDE ONLY	OPEN	OPEN	CLOSED	CLOSED	CLOSED	OPEN	
TO EVACUATE LOW SIDE AND CONTROL CELL UNIT ONLY	OPEN	OPEN	OPEN	CLOSED	CLOSED	OPEN	CLOSE OFF LIQUID MANIFOLD TO RISERS, AND ADD DRUM AT C VALVE OUTLET
TO REMOVE WATER VALVE	OPEN	OPEN	OPEN	CLOSED	OPEN	CLOSED	

NOTE - EXTRA DRUMS MUST BE USED TO HOLD REFRIGERANT WHEN PUMPING SYSTEM DOWN AS RECEIVER WILL NOT HOLD ALL OF THE REFRIGERANT OF SYSTEM - NEVER FILL A DRUM BEYOND 80% RATED CAPACITY AS 1 lb. OF EXPANSION MAY BURST IT

FIG. 12—VALVE SETTINGS FOR SERVICE OPERATIONS

amount of refrigerant in the receiver, this valve cannot be disturbed for evacuating when testing for leaks, as it would allow the charge of refrigerant to mix with the air in the line. A by-pass on the valve board is easily accomplished by adding a ⅝ in. by ¼ in. line valve in the suction manifold, running a piece of ¼ in. tubing between, and a ¼ in. T inserted in the liquid line. Such a connection will be found to be most convenient.

Fig. 12 illustrates the position of various valves on the unit to be operated for the air pressure test. We are assuming that the condensing unit is charged and that a by-pass valve connecting the liquid and suction lines has been installed. Suction valve A is turned in, or closed, to close the low-side and prevent the escape of air. The pipe plug is removed from the A valve service port to admit air into the crankcase. Valves B and C are closed to trap the refrigerant and isolate the condenser and liquid receiver. The ¼ in. liquid line is attached to the service port of the B valve. After building up a high air pressure in the liquid line, the gauge is inserted in the A valve and the stem turned out, which allows the air to enter the crankcase. The pressure on this gauge will record around 40 lbs. Now open the by-pass valve gradually, watching the gauge in the A valve. If the pressure does not rise high enough, close the A valve, remove the gauge and operate the condenser again to pump more air into the liquid line. Some service engineers carry a small drum of carbon dioxide (CO_2) and use it to supply test pressures. Be careful not to allow the full CO_2 vapor pressure to enter the low-side of the Copeland system because it is not designed to withstand pressures exceeding 125 lbs. The bellows in the low-side control and multiple expansion valve might become permanently distorted if subjected to the excessive pressure of carbon dioxide. The vapor should be admitted cautiously by "cracking" open the shut-off valve, observing the pressure gauge while doing so.

In the January issue this article will be continued, describing multiple apartment installations, utilizing the Copeland refrigerating unit, ice cream installations, water coolers and servicing suggestions, including multiple expansion valves, controls, etc.

THE Question BOX

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box" which will be answered by competent authorities.

THE following questions submitted to this department are answered by Mr. George H. Clark, chairman National Educational and Examining Board, Refrigeration Service Engineers Society.

Have any readers other opinions regarding the problems involved. Send them to the Editor.

Norge Flooded Evaporator

QUESTION 96. *I would like to know which type needle—cartridge or other—is used in the old Norge refrigerator flooded evaporator. Also the kind of float used.*

On this evaporator, the liquid line enters the header above the suction line. There is no serial number on the evaporator, but the letter "B" is stamped on the side of the header.

ANSWER: The Norge evaporator to which you refer contains a short needle which fits into a guide and is operated by a part of the float assembly acting on a pin which is located across a slot in the needle itself.

The float is of the type that is commonly referred to as the "tin can" type of float. It consists of a brass cylinder and brass ends soldered on the cylinder. The liquid enters the line in the top of the evaporator. A small tube discharges the liquid entering the valve into the lower part of the header. The suction valve, located on the bottom of the evaporator, takes the vapor from the top of the evaporator by means of a tube extending from the valve as it enters the evaporator head up into the top part of the header. My experience has shown that this type float valve is a very delicate one to repair and it is usually advisable to get a new needle and seat from the Norge Company in order to repair this float valve when any trouble develops. If the float needle becomes a little bit too short, part of the float assembly may come up against the stop before the needle is thoroughly closed and as a result the refrigerant floods right on through.

Frigidaire Flooded Coil

QUESTION 97. *We have a Frigidaire flooded coil which has been used with sulphur dioxide and now want to change it over to methyl chloride for our customer. Can you advise us how to change or adjust the float level in order to make it operate satisfactorily and efficiently with methyl?*

ANSWER: The Frigidaire coil which has been used with sulphur dioxide may be changed over for use with methyl chloride by drilling a small hole in the float arm and in the tip of the vapor outlet tube and installing a small bronze or brass spring between these two points.

A quick calibration of this float with the spring installed may be made by dipping the float into a pan of water and, with the helper spring properly adjusted, the float should float approximately 50% out of the water. The sulphur float without the helper spring, when given the same test, will probably just barely float or may even sink.

Another method of making this change over would consist in unsoldering the float ball of the Frigidaire float and replacing it with a methyl chloride float ball which is considerably lighter for the same volume. If this change is made the float should be calibrated as mentioned previously in order to insure that the float will close off at the proper level.

Short Cycling

QUESTION 98: *Can anyone tell me why after removing brine tanks and installing evaporators the unit continuously short cycles? I have three refrigerators, a single cylinder Kelvinator, twin Servel and single Zerozone model S. All three do the same thing. Two are Fedders and one is a standard evaporator. The evaporators' controls*

and expansion valves are new, and units all have been completely overhauled. Also, evaporators are plenty large to carry boxes. Everything seems to work perfectly outside of short cycling. Unit will run five minutes and off five minutes. I have done everything I can think of and don't know what to do next. Can SO_2 be replaced with methyl chloride in these machines?

ANSWER: In replacing brine tank evaporators with the brineless dry type evaporators it is to be expected that short cycling will develop; that is, the machine will have a short on period and a short off period. If these cycles are less than 15 minutes long, undoubtedly some means can be taken to change this.

The brine tanks have one advantage in that they have holdover or the ability to stay cold after the machine has stopped for some period of time. In order to get the proper length of cycles using a sleeve and tube evaporator which has very little hold over, it will be necessary to operate the controls with a considerably greater differential. For instance, where a setting of 16° to 24°F., which is a differential of 8°F., is suitable for a brine tank, a setting of from 10° to 30°F. or a differential of 20°F. is considerably more suitable for the dry type evaporators. Even with this high differential, it is quite probable that complete cycles will be made in from 15 to 25 minutes. This does not indicate anything wrong with the equipment but is merely dependent on the hold over qualities of the evaporator used. An evaporation temperature of from 0° to 5°F. should be maintained in connection with this evaporator having low hold over.

The Kelvinator and Zerozone machines designed for use with sulphur dioxide may require some changing to make them suitable for use with methyl chloride. Among other things, the compressor speed should be slowed down approximately one-third, the wall should be tested and perhaps a new spring installed to make it suitable for a high crank case pressure such as may obtain with methyl chloride during a continued shut down period and of course the expansion valve should be adjusted to give the same temperature with the other refrigerant.

The Servel machine, I believe, is designed for methyl chloride, unless it has been adapted to sulphur dioxide use.

Using Methyl in Place of SO_2

QUESTION 99: *Being an independent service man that brings me in contact with all makes of refrigerators, I should like to have an answer to the following:*

Where SO_2 is used and springs a leak and I am called on to rush to stop the leak and all the excitement is over and the people of the house can breathe freely again, the first thing they ask is if something else can be used in place of SO_2. I am writing to ask what changes could be made to use methyl in place of SO_2 and do you think the change would be costly?

ANSWER: To change over an SO_2 system to methyl chloride, a number of changes are necessary and it may be that the cost would be prohibitive. The compressor would have to be gone over to insure that the seal will hold a pressure of 80 to 100 pounds in the crank case without opening up. The motor pulley should be replaced by one having a diameter two-thirds of the present motor pulley size. The float valves will have to be recalibrated for methyl chloride. This may be done by changing the floats themselves, by changing the float balls, or by the use of a bronze helper spring in each float valve as shown on Page 19 of the September issue of the REFRIGERATION SERVICE ENGINEER and of course the spring should be so adjusted as to give just the proper closing position of the float; and then of course it would be necessary to thoroughly clean out all the old oil and sulphur dioxide from each evaporator, the compressor and receiver, and to thoroughly evacuate the system before recharging with fresh methyl chloride and oil.

In addition, there may be a little more tendency toward oil bound evaporators in methyl chloride systems than in sulphur dioxide systems so that in order to do a thorough job an oil separator should be installed between the compressor and the condenser to return the oil to the compressor crank case.

You can best estimate what the cost would be by estimating the time required to recali-

brate your float valves, empty the oil out of each evaporator, clean out the compressor and receiver thoroughly and then replace the sulphur dioxide with about 2¼ lbs. of methyl chloride for each 3 lbs. of sulphur dioxide.

Servicing the Allison Refrigerator

QUESTION 100. *What information can you give me on the Allison refrigerator? Can the vacuum be read on these machines with gauge, or would it be necessary to take the vacuum when the machine has enough gas in it? I put a pressure gauge on it and it reads 17 lbs. It will not freeze so I thought there might be either too much gas or too little. To much gas keeps it from freezing; with less gas it would show frost line somewhere on coil and if out of gas it would not give 17-lb. pressure.*

ANSWER: The Allison refrigerator, which later was known as the Holmes refrigerator, has a gauge connection on the top of the compressor dome which has a peculiar sort of valve, the stem of which has an arrow on it and the letters "O" "R" and "C" on the body of the valve. The letter "O" indicates operating position, which passes the refrigerant directly from the dome into the condenser with supposedly no opening to the gauge connection. When turned to the "R" position, this is intended to give a gauge reading as well as allowing the gas to pass from the dome to the condenser; and gives, of course, the high pressure on the system. The "C" marking on the valve indicates an opening from the gauge connection into the condenser with the dome closed off, which is the proper way to have the valve for changing the system.

The head pressure using ethyl chloride operates from 15 lbs. to 20 lbs. gauge when the system is operating properly. A 17 lb. head pressure is about right, but this head pressure will not give you any indication of whether there is enough gas in the machine or not as the system operates with a high side float valve, and with too little gas it will simply mean that the high side float valve will still contain its share of the liquid and the rest will be in the evaporator, which may be only enough to freeze part of the evaporator. With excess charge the machine will flood back to the compressor and of course will not refrigerate properly under this condition.

The proper charge, I believe, is approximately 4 lbs. of ethyl chloride and care should be taken to see that there are no leaks in the system and that the air or non-condensable gases are purged from the high side float valve. The vacuum may be read by attaching a gauge to a connection on the under side of the compressor where the suction line comes in but there is no valve there to close off this connection so that it will be difficult to connect a gauge without losing refrigerant or drawing air into the system. The suction pressure when the evaporator is cold should be from 15 to 20 inches of vacuum.

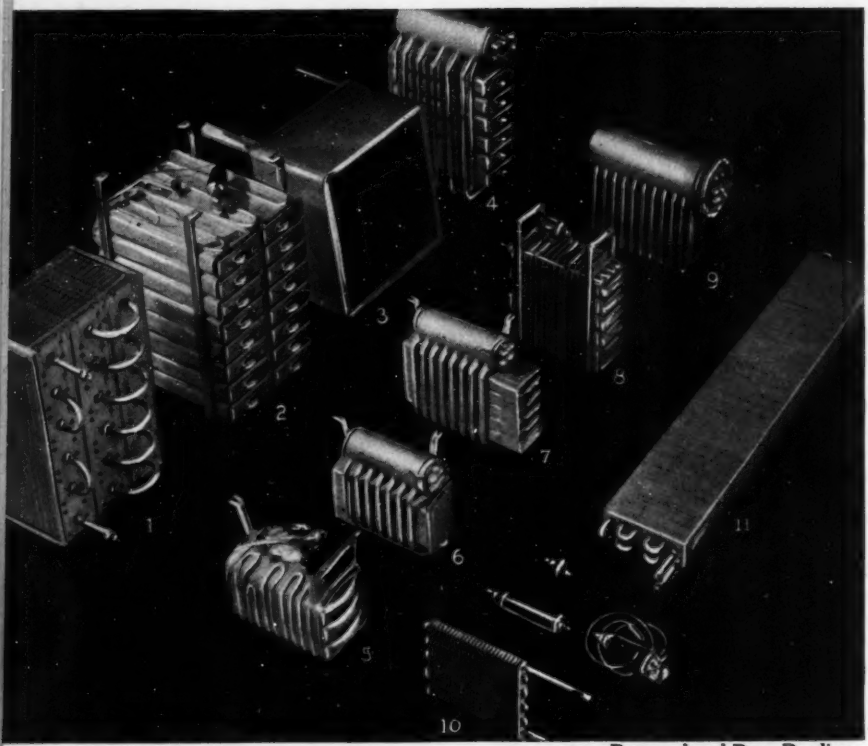
Milk Cooler

QUESTION 101. *A year ago a sixteen crate milk cabinet was installed and has never worked with very good results. It is a ¾-hp. Kelvinator having about 350-gallon brine tank in center of the two compartments. It has a straight expansion valve with a capillary tube in the brine connected to mercury switch shut-off. The machine will work for a short while and then frost-back or go into short cycles, or run for hours without shutting down.*

The cabinet is in a room where there is no heat, the compressor being out doors under cover. The brine tank is made to make four 100-lb. cakes of ice, but has not done so for months. The head pressure ranges from 65 to 90 lbs. sulphur and the expansion valve is set to 5 in. vacuum. To open this any farther makes frost-back, or to close it makes no ice. Having straight expansion valve, makes frost-back on starting, but this never moves off. The valve has been apart for cleaning several times.

I would like to know if this is the right kind of valve to use. If so, the valve must be out of order. Would a thermostatic valve work on such a hook-up? It seems to me the gas should be shut off from the compressor when on off-cycle; by having gas going through makes the compressor run very often.

When You Need Low Sides



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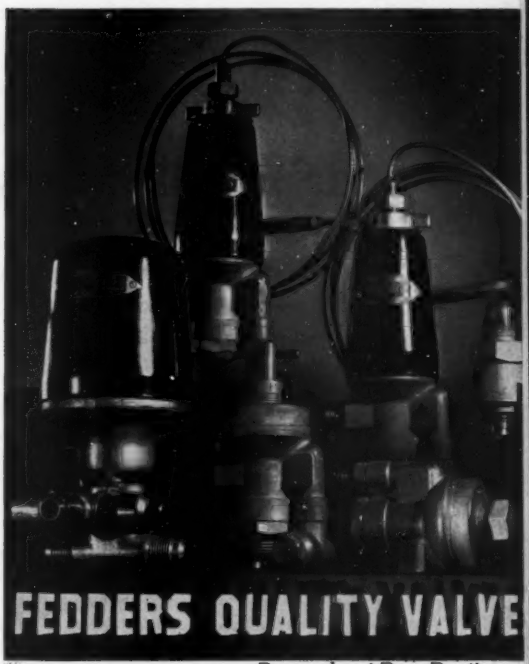

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Can you give the best gravity the brine should test? It may be they have it too weak, and this makes the tubes warm up through it.

The job was sold to keep milk in bottles and crates at a temperature of 40°F., make 400 lbs. of ice in 12 or 16 hours and by using brine pump through milk cooler would bring milk down from blood heat to 40°F. while pouring it through cooler.

So far it has managed to hold the temperature at 40°F. and cool the milk.

ANSWER: The 3 hp. Kelvinator machine operating under the conditions which you state will probably not develop more than 800 I.M.E. for 24 hours. If it froze 400 lbs. of ice in 16 hours, this would probably use the full capacity of the condensing unit and you would not have any excess refrigeration to take care of the difference in temperature between the inside and the outside of the cabinet or to take care of the milk cooler. I believe you will find that your chief difficulty is that you have only about half the capacity your job requires. Not knowing how much milk is cooled, it is difficult to say how much capacity would be required for that part. I believe that doubling your capacity will just nicely take care of this job. Furthermore, I would suggest that a thermostatic expansion valve will keep your coil operating to its full capacity and thereby favor your condensing unit by keeping the suction pressure as high as possible.

Air Conditioning
For Small Stores and Homes

The Four Fundamental Functions of Air Conditioning are Control of Temperature, Humidity, Circulation and Air Filtration—Air Conditioning the Home and Small Commercial Jobs—Opportunity for the Service Engineer.

By T. H. MABELY*

AIR CONDITIONING has been so frequently spoken of in such general and vague terms that for the purpose of clarification, it seems best to re-define our subject at the opening of this discussion. Air conditioning as the name implies is the conditioning or treatment of air but its purpose is best described by saying that it is such treatment of air as will produce the atmospheric conditions like those found on a bright clear April day in the country, after a shower.

Having limited the subject to the treatment of air let us consider just what are the ways in which the air is treated. The four fundamental functions of air conditioning at the present time are: first, control of temperature; second, control of humidity; third, control of circulation; fourth, control of cleanliness or air purity. A complete air conditioning system to some extent performs all four of these functions for both winter and summer conditions.

We are perhaps more familiar with the air conditioner as a piece of equipment that performs a limited combination of these functions. It may condition only for winter weather or only for summer; it may just humidify and filter in the winter time; it may be like many conditioning units being installed in new homes for the purpose of only winter temperature and humidity control and year 'round filtering and circulation; it may be even just a humidifier for increasing humidity during the winter

* Air Conditioning Corp.

months, or it may be a cooling unit for temperature control and some uncontrolled dehumidification during hot summer days.

All these are air conditioners and perform one or more of the functions of air conditioning either partially or completely. Thus we see the field is a very broad one and not limited to just a humidifier for example, or a summer cooling installation such as many people are inclined to consider as complete air conditioning.

Control of Temperature

We shall endeavor to see just how these functions are performed by an air conditioning system. The first function, the control of temperature has been, since early history, one of the concerns of man. We are familiar with the control of temperature in the winter time by open fires, stoves and furnaces, etc. Recently the operation of such equipment has come under automatic control. Concerning the relief from hot weather, cool places have always been sought or constructed. Of recent date the cooling of stores and theatres has become fairly common and now homes are coming to demand this comfort. In many of these places the same system which performs the summer temperature control may be so designed that it can handle the control for winter temperature as well.

It may be best here to point out that the problem of automatic control for the entire year somewhat complicates itself since contrary to general opinion the desirable room temperature is not constant year 'round but ranges from about 70° F. in mid-winter to about 80 to 85° F. in mid-summer. This perhaps can be explained on a physiological basis by saying that our bodies would rather have a warmer mean temperature in summer than in winter, rather than stand the shocks of too great a drop between inside and outside conditions during the hot summer days. The only time we are interested in a fixed temperature for all seasons of the year is perhaps in a processing job. We therefore find it necessary to so design our cooling equipment to give us the maximum temperature reduction at times of extreme summer temperatures but our control if ideally automatic should be designed to alter this temperature difference as to reduce the difference between inside and outside conditions as the weather becomes cooler. Some of the commercial installations that advertise "70° F. inside" or "20° F. cooler" may be kicking back on themselves due to the desire to freeze their customers rather than give them air conditioning along the lines we have been considering.

Control of Humidity

The control of temperature is interlocked with the second fundamental function of air conditioning, namely, control of humidity. It doesn't take an engineer to realize that a room at 72° F. and 10 per cent relative humidity may feel colder than a room at 70° F. and 50 per cent relative humidity. Humidity is simply the measurement of moisture content in the air. The relative humidity is the portion of moisture already in the air as a percentage of the total amount of moisture required to saturate the air at the given conditions. Since we know that warm air will hold more moisture before it becomes saturated than cold air, we can understand why cold air, even though its humidity may be 90 per cent, when heated becomes something like 10 per cent.

This is just what happens in winter time; we bring cold air with a small amount of moisture into the house and heat it up and its relative humidity becomes very low, hence we have the feeling of dryness in winter. Again, contrary to some household practices, opening windows in a tight but well heated house does not necessarily increase the relative humidity in that house. However, there are many devices on the market of various types for increasing the relative humidity in the winter time inside a conditioned space.

When we come to summer humidification control we have the reverse operation of removing moisture from the air to give a comfortable condition. Again we apply the previously mentioned fact that warm air has the capacity to hold more moisture than cold air. If we cool the air we can condense the moisture out of the air in the same way that the coolness of the night causes moisture to come out of the air in the form of a dew. The actual control of summer humidity is a difficult problem and so much so that at the present time most conditioning installa-

tions merely control the dehumidification as a function of cooling. In other words, the temperature is controlled with a thermostat and summer dehumidification will be accomplished to whatever extent the cooling coils will permit while in operation for air temperature reduction. The most recent developments along the line of coil and control design are tending more and more toward an independent control of humidity for summer conditions.

Let us now consider the third function of air conditioning, the control of circulation.

Control of Circulation

We know that we feel comfortable with a fan blowing air past us rapidly on a warm summer day and, on the other hand, the same fan blowing the same amount of air might feel very uncomfortable in the winter. Here we have a good example of one of the limitations of air circulation in air conditioning. The circulation of air serves two major purposes: first, it serves the purpose of changing the air so that as it becomes permeated with dirt, is too hot, too cold, too humid or too dry, it may be exhausted or returned to the conditioner for reconditioning and replaced by conditioned air. This change of air, if rapid enough also assures a fairly even distribution of temperature throughout the conditioned space. The second purpose of circulation tends more directly towards comfort and is best illustrated by the fan which I have just mentioned.

As you all know the body is a machine and like a machine, an automobile for example, it must throw off part of the heat energy taken into the system in the form of fuel or food. The automobile accomplishes this with its radiator. The human radiator is the skin itself. The amount of heat actually thrown off by the human body has been measured and the actual figures range from 400 B. t. u. for a person seated in a room up to over 2,500 B.t.u. given off by a person in an extreme state of physical activity such as running up a hill.

To give you a simple illustration of what this amounts to I might explain that the total heat generated by 250 people seated and at rest is sufficient to heat a modern six or seven-room house in the middle of the most severe winter. The same could be accomplished by the total heat from forty-five people in the state of vigorous activity equal to a five-mile-an-hour walk or the like.

Therefore we must have a movement of air to facilitate the removal of this heat from the body and prevent the temperature of air very close to the body from building up to an uncomfortable degree. On the other hand we can have the other extreme of this condition, with too great a movement of air or circulation of too cool air, with the result that heat is taken from the body faster than the system can generate heat. All these factors the engineer must bear in mind when designing a system for comfortable air conditioning.

Air Filtration

The fourth fundamental function of air conditioning is air filtration. If the housewife could dust only twice a week instead of three or four times and if the women's apparel shop owner could cut his cleaning bills in half by elimination of dust and dirt from the outside the importance of this function would be realized. Today this performance is actually possible. With dust and dirt so prevalent in the atmosphere, particularly in the city, some means of removing the larger part of this foreign matter had to be made a part of every good air conditioning system.

Filtering is accomplished in various manners, such as washers, scrubbers, oil filters and dry filters of either the cleanable or renewable type. These filters are designed to remove the largest part of the foreign matter found in the air but do not leave the air entirely pure. The cost and design of equipment has limited the capacity of the filter to do more than say a 95 per cent job in respect to dirt removal and much less efficient job as to smoke, odor, and pollen removal. However, the results obtained have warranted the use of filters on almost every complete air conditioning job.

The problem of smoke, odor and pollen removal is still being worked on in the laboratories and no positive statements can be made at the present time as to what we may expect in the near future along this line. We do know that the use of filters with some

means of cooling and dehumidification has given some appreciable relief to approximately 50 per cent of hay fever sufferers, but so many other factors have entered into the picture that scientists are not yet certain just what obtainable air conditions will give 100 per cent relief from hay fever. Engineers are still working with the problem of reducing highly objectionable concentration of tobacco smoke. At the present time the most effective method is to exhaust the smoky air to the outside and replacing it with fresh air, but this practice is costly because the air brought into the area has to be conditioned before introduction into the room.

Having briefly looked at the fundamental functions of air conditioning we can now consider some of the types of equipment used for performing these functions, particularly limiting our consideration to homes and small commercial applications.

Air Conditioning in the Home

Let us first see how air conditioning is used in the home. The radiators for steam or hot water serve in one way or another to control winter temperatures, but now with the demand for some sort of a system that will perform some of the other functions of air conditioning, we find many changes in the heating system to permit application of factors other than heating. Looking at any number of modern houses we see the radiators in the major rooms have disappeared and are replaced by small grilles properly located either in the base board or in the wall near the ceiling. The steam or hot water pipes have been replaced with sheet metal air ducts, which if properly laid out, can be neatly concealed in the joists and by furring to enhance the appearance of the basement. In perhaps 95 per cent of the new homes now under construction we find this central conditioner which in most cases performs the functions of temperature control, humidity control, filtering, and circulation for winter and occasionally we find an installation to carry out these functions for both winter and summer.

These installations for winter conditioning can be readily used for circulation and filtering during the summer but now the remaining two functions of temperature and humidity control are becoming more and more important as the public demands all the comforts of air conditioning.

It is interesting to note that with the widespread interest in air conditioning, installations such as I have just spoken of have already been installed in a large number of homes and that in these cases if properly designed the work of making a complete installation is more than half done. In other words, if the air conditioning system for winter is properly engineered and installed, the major requirements to make the job complete for both winter and summer is the installation of a condensing unit and evaporator along with perhaps a few minor changes such as insulation of basement duct work to prevent sweating, or possible changes or additions to control system. The performance of the system for summer cooling and dehumidification depends a great deal on the original engineering of duct distribution system as well as the proper installation of the condenser and evaporator coils.

To refrigeration men the actual cooling by mechanical or some other method of refrigeration is nothing new so I do not need to elaborate upon that subject except to mention that on the average installation the refrigerant temperature usually runs higher than on the refrigeration application, being seldom much lower than 25°F. and higher than 50°F. I have found most people puzzled by the fact that such a large compressor is required for the installation of cooling in homes. This may be clarified by explaining that to date most of the mechanical equipment used is the same type as used for a domestic refrigerator and if we compare the volume of a household refrigerator having a 1-8 hp. motor to a house of two thousand times that volume having windows and not being as well insulated we can readily see why a 3 hp. motor would be required.

I have previously mentioned air conditioning for the whole house and particularly in cases where the system is at least partly installed at the time the building is built. In the case of the home already built the same problem for an air conditioning engineer is found as in an office or small com-

(Continued on page 36)

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Official Organ
REFRIGERATION SERVICE ENGINEERS' SOCIETY

ADVANCEMENT

"The service man with some experience is always hardest to educate. To you who are in that class, we ask only that you refresh your memory by reading these pages. The man is indeed an authority who cannot profit in some way by doing so."

(From the service manual of a large commercial machine manufacturer)

A WEALTH of sound advice is contained in the above admonition to the man who would keep abreast of the advancements being made in the profession that provides him with his livelihood. Let's pause and occasionally take an impartial inventory of ourselves. It's surprising at times to find out how fast the parade is going by.

But getting back to the subject of this Editorial, there are plenty of men engaged in the field today, who believe there is little else worth knowing that they are not already acquainted with. Self-satisfaction is dangerous. The accepted methods of yesterday are obsolete today.

A periodical check-up on the many service operations we accept as right just because of many years' continuous practice is oftentimes desirable.

The refrigeration industry has been outstanding in the advancement it has made during the past few years. Its activity compared to other large industrial fields has been most remarkable. And with this progress has come a tremendous advancement in design and production. This is only the natural result of a business with the unlimited possibilities refrigeration faces, and its increasing application in many diversified fields.

Its very progress is further evidence of the necessity of the individual to provide himself with every facility to keep posted on these new developments. Manufacturers of equipment and accessories have adopted an unselfish program in making extensive laboratory tests approximating actual field conditions, and, in turn, making this information available to those who desire to further their advancement.

S S S

Truman B. Welch,
Massachusetts.

I anticipate with great pleasure another year's acquaintance with THE REFRIGERATION SERVICE ENGINEER and enclose $2.00 for a renewal of my subscription.

A. G. Dietl.

I would like to say that the information derived from your publication is inestimable.

R. M. Mahler,
Connecticut.

Here is my $2.00 for another year. It certainly is worth this price to any service man, who wants to keep informed. My only criticism is that it does not come frequent enough. My best wishes for 1936.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; with special reference to servicing and installation of domestic and small commercial equipment; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

ASSOCIATION HEADQUARTERS: 433-435 North Waller Ave., CHICAGO, ILL.

FROM THE PRESIDENT

By JAMES H. DOWNS

ONE of the first aims of the new national officers is to increase our membership. To that end we are designating the month of January, 1936, as "Membership Month."

JAMES H. DOWNS, Detroit
President, R.S.E.S.

It shall be the aim of the officers to form as many new chapters as possible, and the aim of each individual chapter to increase its membership.

Mr. J. D. Gray, of St. Louis, Chairman of the Membership Committee, is to be in charge of the membership drive. The National Society is offering a trophy for the chapter making the best showing.

Inquiries are being received from other cities as to the formation of new chapters, and as fast as it can economically be done new local organizations will be formed.

The various committees are being organized, and their reports will be published in this column from time to time.

We officers appreciate that there will be better officers in future years, but at least we're going to give them a mark to shoot at. So send us your problems. Let us know of any way we can assist you in your local problems.

January Is Membership Month

But, first of all, *let's make Membership Month a success.* Ask 'em to join! We have a really constructive program to offer any man interested in service work. Any man interested in his future welfare should be an active member. Each individual one of us will only get out of this Society exactly what we put into it. And no one can expect to sit back and let their elected leaders perform miracles. *So let's put it over!*

It has been suggested, that although it is rather late in the season, the various chapters form Bowling Leagues, and possibly have a few inter-chapter tournaments. Any bowlers interested? Possibly these long-distance tournaments could be arranged by telegraph, to avoid traveling expense. Address J. H. Downs, 2552 Blaine Ave., Detroit, Mich.

We will soon have an announcement regarding membership buttons. Designs are being considered, and you can be assured that it will be a button that you'll be proud to wear.

CHICAGO CHAPTER

Meeting of November 12, 1935

By H. D. BUSBY, *Secretary*
5611 Lawrence Ave., Chicago

PRESIDENT PAUL JACOBSEN gave a resume of the convention as seen by him for the benefit of those who were not there. Mr. H. Drownes and Mr. F. Roth gave their reports as delegates to the convention.

Mr. Drownes, reporting for the Credit Committee, gave a review of what has happened on the Credit Committee, including action taken at the National Convention and at the committee's meeting of November 5th. After reading the plan as outlined by the committee for the formation of a Credit Information Bureau, a motion was made by Mr. R. Vanston, seconded by Mr. Roth, and duly carried that Mr. Scher's plan be adopted by the society.

Mr. Goldberg, reporting for the Entertainment Committee, suggests a party be held about the first Saturday in December and asks for some additional funds from the chapter's treasury to help finance the party.

Due to the savings that can be effected it was suggested that the society purchase a mimeograph to become a part of the secretary's equipment in order to facilitate the sending out of meeting notices and other mimeographed matter. A motion was made by Mr. Drownes and duly seconded and carried that the secretary be empowered to purchase this machine with the limit of $80 as the purchase price.

Mr. George Monjian gave a short talk on what the society means and can do for the service man of today, pointing out how difficult it was during the early days of refrigeration to secure the information you needed in servicing machines.

Meeting of November 26, 1935

THE meeting was called to order at 8:30 P. M. Officers present were: Jacobsen, Roth, Skipple and Busby.

Five new applications for membership were read, and the new members welcomed.

Correspondence pertaining to the society's business was read.

President Jacobsen appointed an Auditing Committee consisting of Mr. Vanston, chairman; Mr. Schroeder and Mr. Karlberg.

Mr. L. C. Kohlman of the General Electric Corporation and Mr. George W. Fawcett of the Frigidaire Corporation were introduced as visitors for the evening.

On the educational program for the evening, Mr. Fawcett gave a very interesting talk on the subject, "Service as the Link Between the Manufacturer and the Consumer." The highlights of Mr. Fawcett's talk and the points he stressed were: the necessity for a uniform rate; licensing of all organizations by the city, and the desirability of living up to the city code and taking out permits on each job.

Mr. Fawcett stated that the Frigidaire Corporation, in the immediate future, is going out to inspect various independent service shops with the purpose in mind of arranging to sell them parts where they find the organization of such character as worthy of their affiliation, with the hopes of cooperating with them to the end of rendering better service on Frigidaire machines. He stated, in addition to this, that they will give

out literature or any information required to those shops to whom they sell parts.

In discussing the rate question, Mr. Fawcett recommends a $2 per hour minimum charge covering the first half hour of labor on the premises and 50c for each additional fifteen minutes.

Mr. Kohlman spoke briefly, expressing their desire to cooperate and his gratitude in being able to attend our meeting.

Mr. Goldberg, reporting for the Entertainment Committee, reported final arrangements had been made for the Past President's Night to be held in the Stevens Hotel on December 7, and asked for $50 from the treasury to help cover expenses. A motion was made by Mr. Vanston and duly seconded and carried that the treasury grant the $50 for expenses to Mr. Goldberg.

Mr. Goldberg also reported that arrangements had been made to meet in the Stevens Hotel in the future if the membership was agreeable to the move. A motion was made by Mr. Vanston and seconded by Mr. DeGan and duly carried that we meet in the future in the Stevens Hotel.

ST. LOUIS CHAPTER

Meeting of November 14, 1935

By E. A. PLESSKOTT, Secretary
2145 67th St., St. Louis, Mo.

THE regular meeting of St. Louis Chapter, held at the Crunden Branch Library, November 14th, was called to order by President Gray at 8:30 P. M.

The speaker of the evening, Mr. E. Rogers Hewitt, air conditioning engineer of the Sodeman Heat & Power Company of St. Louis, upon finding out that Mr. D. D. Wile of the Detroit Lubricator Company was in town and ready to address us, willingly postponed his talk for one of our future meetings, and turned this meeting over to Mr. Wile, who spoke at great length on the proper installation of expansion valves and stressed the need for better dehydration of the large systems now being installed.

He advised those present that his company, together with other interested organizations, were at present engaged in making exhaustive tests and doing research work for the purpose of ascertaining the most

effective way of removing moisture and that at the conclusion of these tests, whatever knowledge gained will be passed on to the service engineer.

President Gray advised all that there would be no meeting Thursday, November 28, Thanksgiving Day, but requested all to attend our remaining meetings of the year in order to get a good line-up of officers started for the coming year.

KANSAS CITY CHAPTER

Meeting of October 29, 1935

By C. F. RAMEY, Secretary
4322 Flora Ave., Kansas City, Mo.

MEETING was held at the Commonwealth Hotel in Kansas City, and was called to order at 8:20 P. M. by President S. A. Leitner, with roll call being the first order of business.

There being no special communications nor reports from Membership or Educational Committees, a short announcement was made by Mr. J. P. DeWilde, chairman of the Committee on Standards, regarding a special meeting to be held Tuesday evening, November 5th, at the office of the Cox Refrigeration Service Company to discuss standard prices and policies as a guide for independent service companies. All those interested in this matter were urged to attend that meeting. An urgent request for payment of unpaid dues was made by the acting treasurer, to bolster up the funds for coming activities and expenses.

Visitors Dick Gleason and A. A. Monroe were introduced and indicated interest in the activities of our society. Also, a greeting was received from Mr. Otto Williams, a member of Memphis Chapter. Mr. Williams promised a favorable report to his home chapter upon his return, on the enthusiasm and interest displayed by the Kansas City members.

Dispensing with educational matters, the meeting was turned over to the members who had been in attendance at the national convention, for their reports. We were honored to learn of the appointment of our President, Mr. S. A. Leitner, to the office of Treasurer of the National Society. Convention highlights were ably and entertainingly presented by President Leitner, Vice-President R. F. Cox and L. H. Roberts, members; and by Mr. Joe Leitner who accompanied them. From reports given, the interest, enthusiasm and sincerity of attending members and exhibitors, certainly made a wonderful impression on those in attendance. And this bond of feeling and spirit of cooperation established at this convention as brought to us by our representatives, if kept alive by actual work of all members and societies can mean only a wonderful growth of the organization of which we are members. Every member present who had not been able to attend the national convention expressed regret and promised to make every effort to attend the next one.

Many helpful suggestions for making future meetings more interesting were received and the various committee chairmen are expected to make use of same.

President Leitner appointed L. H. Roberts and W. R. Jones as the Entertainment Committee, they to choose another member. This committee is to function along with the educational chairman in making future meetings more entertaining and interesting as well as educational.

Meeting of November 12, 1935

NO COMMITTEE reports were available from the Membership, Educational or Entertainment Committees. Mr. J. P. De Wilde, chairman of the Committee on Standards, reported progress being made in standardizing prices and policies for independent companies. Further meetings are planned and those interested in definite price schedules are urged to attend.

A special communication from Mr. H. P. Scher, general counsel for the National Society was read, in which the plans for the establishment of the Credit Information and Collection Bureau were outlined. By motion by R. F. Cox, seconded by H. F. Andrews, it was unanimously voted that cooperation of the Kansas City Chapter he pledged toward the establishment of this Credit Bureau, and every assistance possible will be rendered by the Kansas City membership, collectively and individually.

A special communication was also read

from Mr. Paul Jacobsen, first vice-president of the National Society, who is also chairman of the Grievance Committee, asking for reports from any and all members on anything beneficial to the organization. On motion by T. L. Anderson, and seconded by H. L. Green, it was unanimously voted that all assistance possible be given Mr. Jacobsen in carrying out the duties of his office and that fullest cooperation possible be pledged toward the building of a successful organization for the coming year.

A special communication from National Secretary H. T. McDermott was read, in which the appreciation of the National Society was extended for the assistance so ably rendered by Mr. Joe Leitner to exhibitors and others at the national convention. As a tribute to Mr. Leitner it was suggested that an honorary membership be tendered to him. This was declined, however, by Mr. Leitner in a short talk in which he indicated his intention of becoming an associate member through his association with the Leitner Refrigeration Service. Accordingly, the following actions were taken:

Motion by H. F. Andrews, seconded by R. E. Kingsolver, that we accede to Mr. Leitner's request, in which he thanked our chapter for the offer of an honorary membership, and that the offer be withdrawn and he be permitted to make formal application for an associate membership. Vote carried.

Motion by R. E. Kingsolver, seconded by R. F. Cox, that the National Secretary be advised by letter of the tendering of an honorary membership to Mr. Joe Leitner, of his kindly refusal of same, and of his desire to make formal application for an associate membership. Vote carried. Motion by H. L. Green, seconded by H. F. Andrews, that an application in regular form be tendered Mr. Joe Leitner and with it the expressed wish of our membership for the early return of said application, that official action might be taken and the service of Mr. Leitner thereby accrue to the chapter as coming

from an active associate member. Vote carried.

Before adjournment, the following resolution was offered:

WHEREAS, The Kansas City Chapter in regular meeting assembled desires to extend to the National Officers and the Board of Directors of the Refrigeration Service Engineers' Society, the well wishes of Kansas City Chapter for a successful year in 1936, and

WHEREAS, The Kansas City Chapter desires to go on record in pledging itself to do everything possible and render all helpful assistance to the National Officers during the coming year in any way pertaining to the good of the society, and especially in matters pertaining to helping Memphis Chapter in carrying out the program for the next national convention—Be it therefore

RESOLVED, That the Secretary be hereby instructed to communicate and convey the wishes of the Kansas City Chapter to the National Secretary, the National Officers and the Board of Directors.

On motion by R. E. Kingsolver, seconded by R. F. Cox, the above resolution was unanimously approved—copy of same to be forwarded to the National Secretary.

RESULTS OF CERTIFICATE EXAMINATION ANNOUNCED

SUCCESSFUL applicants of the Certificate Examinations recently held in several chapters were notified of their advancement to certificate membership by the national secretary's office pursuant to the final decision of Mr. George H. Clark, chairman of the National Educational and Examining Board.

To qualify the member must have not less than two years of practical service work and attain a mark of 75 per cent on the examination questions.

The following members were the successful contestants:

Detroit Chapter—James H. Downs, J. E. Perry, L. R. Burns, J. P. Lindsay, R. Tudhope, A. B. Plassey, W. F. Mercier, C. Bottoms.

Chicago Chapter—Paul Jacobsen, Harry D. Busby, R. L. Hendrickson, R. B. Vanston, B. H. Horne, F. H. Roth, W. S. Helmuth.

Youngstown Chapter—C. P. Eich, J. D. Nutt, E. S. Wright, M. W. Remaley.

Each certificate member will be awarded a "Certificate of Proficiency," attesting to their new classification of membership.

MEMPHIS NOTES

MR. B. L. BRIDGES, Memphis Chapter secretary, has taken over the United Refrigerator Service Co. Mr. Boyd Evans, formerly in charge of the above company, is devoting his entire time to the United Refrigerator Supply Co., distributors of refrigeration parts and accessories.

It has been reported hereabouts that J. R. (Bull) Woods lost his police dog while in Detroit. Any information regarding J. R.'s pet will be appreciated.

Since the Detroit convention, A. R. Black has been officially appointed our "crack salesman" for the 1936 Memphis convention, with Ed. Wright of Youngstown chapter as his able first assistant.

PITTSBURGH CHAPTER

Meeting of November 11, 1935

By F. V. GOLITZ, Secretary
1518 Davis Ave., Pittsburgh, Pa.

THE regular meeting of the Pittsburgh Chapter was held in the Corporation Room of the Commonwealth Building, with President C. O. McCauley presiding.

President McCauley read the correspondence regarding the National Counsel and the Credit Bureau.

A discussion of ways and means of obtaining a larger attendance at the meetings was followed by the appointment of the following committee to contact absentees: Messrs. McCauley, McCloud, Golitz and Kane.

President McCauley was congratulated on his election to the National Board of Directors. Congratulations were also in order for Mr. McCloud, who was elected president of the National Refrigeration Supplies Whole-

salers Association. Mr. McCloud gave a brief talk on the newly formed association.

A short report on the Detroit Convention was given by President McCauley. The formal report will be given at the December meeting.

Mr. Hood of the Ansul Chemical Company gave a talk on "Testing Refrigerants for Moisture."

On behalf of the members, President McCauley thanked Mr. Hood for his interesting and instructive talk.

S S S

DETROIT CHAPTER

Meeting of November 20, 1935

By J. E. PERRY, Secretary
5309 Hamilton Ave., Detroit, Mich.

MEETING was called to order by Second Vice-President Wilbur Mercier. The minutes of the last meeting were read and approved as read.

Mr. Mercier introduced Mr. Hiedeman of the Air Flow Corporation, who was the speaker. The subject of his talk was along the line of being competent refrigeration service men. He also stressed the importance of banding together for a common good.

Mr. Neudeck next had the floor. He read a copy of the proposed ordinance as recommended by the Department of Building and Safety Engineering. He then explained the various phases of this proposed ordinance. Discussions were heated and various regarding the proposed three-year clause, but when put to a vote the motion carried 18 to 1.

Next was a report from the Membership Committee by Mr. Gammon.

A report from the Auditing Committee was given by Mr. Racklyeft, who asked for more time to compile the final report as some of the necessary bills were missing. Motion was made and supported that the Auditing Committee be given until the next meeting to turn in their report on the convention expenditures.

Mr. Mercier next appointed an Advertising Committee to formulate and recommend a suitable advertising program. The committee appointed consisted of: Messrs. Euth, Barnes, and Tudhope. A report is to be made at the next meeting.

Letters were read by Secretary Perry from Mr. H. P. Scher, relative to the credit situation. The secretary was requested to write Mr. Scher and acquaint him with Detroit Chapter's attitude.

The resignation of Mr. Clark as chairman of the Educational Committee of Detroit Chapter was read and the consensus of opinion among the members was that the resignation should be held over until the first of the year for our general election. Inasmuch as there are only two more meetings, Mr. Clark was asked to retain this job, the resignation to go into effect the 1st of January, 1936.

The meeting adjourned at 11:05 P. M., and, believe it or not, the gang adjourned to the White Tower! This is cause to start a grand jury investigation.

Meeting of December 5, 1935

The regular meeting of Detroit Chapter was held at the United Motors Building on December 5th.

The meeting was called to order by 2nd Vice-president W. F. Mercier. The minutes of the last meeting were read and approved as read. Mr. M. Gammon gave the report of the Membership Committee and outlined the procedure to be followed on the handling of all applications in the future.

Mr. G. Racklyeft gave the report of the Auditing Committee. A motion was made and supported that the Treasurer be prepared to give a statement of his expenditures and money received at every meeting. The motion carried.

At this time Mr. Perry reviewed the resolution on Associate Members and gave the service man's picture of this Society. A vote was taken and carried 22 to 0 to amend our Detroit Chapter By-Laws by adding a Section 3 to Article V on privileges of members, to read as follows: "Associate Members shall have no vote in the election of officers or on questions pertaining to the welfare or policies of this Association."

Mr. Neudeck next read a final draft of the proposed ordinance which has been approved by the Department of Buildings and Safety Engineering. It also has been approved by the Corporation Counsel's office.

There followed a short discussion by the members.

Mr. Wm. Euth, as chairman of the Advertising Committee, promised a complete set-up on an advertising program for the next meeting.

Mr. Mercier appointed a committee consisting of Messrs. Tudhope, Murphree and Perry. The job of this committee is to lay ont plans for a permanent meeting place.

A letter was read by the Secretary from the National Secretary naming the eight Certificate Members which Detroit Chapter now has. Refreshments were served by United Motors.

* * *

DETROIT CHAPTER ADVERTISES COOPERATIVELY

THIRTEEN members of Detroit Chapter participated in a cooperative advertisement which appeared in the *Detroit Free Press* on Sunday, November 3rd. This advertisement appeared on the building page of the newspaper and featured the seal of the society. A reproduction of this advertisement which was the largest on the page is reproduced herewith. The advertisement measured four inches square. The text of the advertisement informed the public that membership in the R.S.E.S. was assurance of qualified service in refrigeration work.

Efficient Refrigeration Service

WE DO IT RIGHT

FOR BETTER REFRIGERATION SERVICE!

The REFRIGERATION SERVICE ENGINEERS SOCIETY was formed with but one idea, that of giving you better and more efficient refrigeration service. This emblem is your guarantee of satisfactory service. The firms listed below are fully qualified to solve your refrigeration problems.

ABC Refrigeration Service 14000 Dexter UN. 1-9500	**Electric Service Co.** 8810 Puritan UN. 2-4180
Ace Refrigeration Service 228 Rhode Island TO. 6-0930	**Electric Ref. & Motor Service** 3733 Tyler HO. 1090
Chas. Ahel 14901 Mendota HO. 4324	**Mercier & Clark, Inc.** 6823 Grand River GA. 8330
Buras Refrigeration Service 139 Newport N. LE. 0204	**Model Refrigeration Service** 12776 Greenlawn HO. 0443
Dowes Service 2562 Blaine GA. 0860	**Jos. E. Perry Co.** 8309 Hamilton TE. 1-8558
Detroit Refrigeration Service 5034 Trevnon EU. 7606	**Redford Refrigeration Service** 21660 Santa Clara RE. 1365
	Square Deal Electric Refrigeration 8008 Harper PL. 8399

AIR CONDITIONING FOR SMALL STORES AND HOMES

(Continued from page 25)

mercial building. In these cases we must resort to the best method which is usually a compromise between the ideal system previously mentioned and the present heating or ventilating system. One of the biggest problems of the air conditioning engineer is to know how far he can go without doing too much cutting and altering of the building walls, floors and partitions and making the installation costs prohibitive.

The resulting compromise installation may be, for instance, a unit in the basement of the home with a duct distribution system to handle the first floor and on the second floor replacement of radiators with individual air conditioning units. This individual room unit may be one of many types. It might be entirely self contained, either portable or stationary or it might be a unit with a conditioner coil, humidifier, blower and filter and with steam, water or refrigerant lines connected to another unit in the basement. These small units are only replicas of the large unit previously described and it is easy to see that if one large unit could be installed to distribute conditioned air to the various rooms it might be the most economical method. However, if a duct system is prohibitive, or where individual control of each room is important a system of small units may be preferred.

Small Commercial Installations

Now when we come to a small commercial installation we find in some respects similar applications. Often in the case of small stores, restaurants and the like the single large unit may be more readily used due to the fact that fewer partitions are encountered and the conditioned areas are larger. However, there are often conflicting opinions on the type of an installation that would be recommended for a particular case. For example, two or three small units located properly might give equal performance to a central unit with duct system for distribution of conditioned air. In this case the difference in installation work might be the deciding factor. On the other hand the reverse case where performance would be the deciding factor has often occurred. Due to the fact that up to the present time definite standards have not been completely established, it is rather difficult for an engineer to determine conclusively just what is the best procedure for all cases.

For the future we see many important developments and needless to say the refrigeration service engineer will more and more play an important part in the air conditioning field.

* * *

CHICAGO CHAPTER CHATTER

By HERMAN GOLDBERG

STARTING with the next meeting, Chicago Chapter will add dignity and prestige to the Stevens Hotel (which happens to be the largest in the world) by holding all future meetings at that hotel. Our new meeting hall will seat at least 100 very comfortably, and the hotel management has promised to cooperate with us in every respect.

Our Past President Night, December 7th, is also scheduled for the Stevens, and the Entertainment Committee promises everything in the way of a good time. Our past president, Tom Fowler, in whose honor this affair is being given, has been reported seen visiting a number of hat stores, but up to date has been unable to find a hat large enough to fit.

There is a rumor around town that our National Secretary, Harold McDermott, left his golf clubs in one of the shops, the personnel of which has probably never had occasion to use clubs before, and I understand that Harold's mashie was used in an attempt to annihilate a field mouse which tried to share the quarters of this active refrigeration service company, whose name will be furnished on request.

There is also another rumor that Fred Roth thinks so well of transferring people from place to place that he is seriously considering changing all his service automobiles into taxicabs. That might not be such a bad idea at that.

To all you men who probably won't take advantage of my warning, I say don't let

Arnold Schroeder inveigle you into playing checkers. The guy is just too good.

This being the slack season for gossip, we'll say that's all for this time but just in the event that you may run into something, don't forget to send it to my office.

* * *

SUBSTITUTE FOR BRINE SOLUTION

A NEWLY developed oil made by the Standard Oil Company, is their formula No. 10094. This is an odorless oil which has a pouring point of minus forty degrees Fahrenheit. As all oils are combustible, the flash point of three hundred degrees is of interest. The cost of this oil is comparatively high, and in trying to develop a less expensive oil, they have produced a No. 9 refined oil. This oil is essentially a deodorized kerosene. It will pour at minus eighty degrees Fahrenheit. The flash point of this oil is comparatively low, although it does not present a fire hazard. The flash point is one hundred sixty-five degrees Fahrenheit. These oils act differently from brine solution, due to the fact that they do not transfer heat as readily. This gives them the disadvantage of cooling slower, but gives them the advantage of holding the cold longer.

These solutions all have the advantage over brine, because they do not have the corrosive action of brine. It will be up to the experimenter to ascertain the advantages.

A solution of glycerine and water is more commonly used to replace brine solution. It is advisable that a pure glycerine is used, as the less expensive glycerine has organic fats in it that will become rancid. The following table will give the percentages of glycerine necessary to reach the various freezing points:

Per Cent by Weight of Glycerine	Specific Gravity	Freezing Point Deg. Fahr.
10	1.0245	30.2
20	1.0498	27.5
30	1.0771	20.8
40	1.1045	1.0
45	1.1183	-15.2
50	1.1320	-25.6
60	1.1582	(Below) (-31.0)

Want *Information*?

Use The R. S. E. SERVICE DEPARTMENT

—It's for Your Convenience

THIS department is conducted for the convenience of our subscribers. We will ask the manufacturers and distributors to send you the latest information on the items checked.

- ☐ Belts
- ☐ Blow Torches
- Blowers (see Unit Blowers)
- ☐ Books
- ☐ Brushes, Motor
- ☐ Bushings, Motor
- ☐ Carbon Tetrachloride
- ☐ Charging Hose
- ☐ Charging Stand
- Coils
  - ☐ Fin
  - ☐ Pipe
- ☐ Compressors
- Condensers
  - ☐ Air Cooled
  - ☐ Water Cooled
- ☐ Condenser Water Regulators
- ☐ Connecting Rods
- Controls
  - ☐ Cold
  - ☐ Humidity
  - ☐ Liquid Level
  - ☐ Pressure
  - ☐ Temperature
  - ☐ Thermostatic
  - ☐ Water
- ☐ Domestic Evaporators
- Dehydrants
  - ☐ Activated Alumina
  - ☐ Calcium Chloride
- ☐ Dehydrators
- Door Seals (see Gaskets)
- ☐ Drums, Service
- ☐ Dryers
- Evaporators
  - ☐ Dry
  - ☐ Flooded
- ☐ Fan and Pulley Assemblies
- Filters (see Strainers)
- ☐ Float, High Side
- ☐ Float Valve Seats
- Fittings
  - ☐ Flared
  - ☐ Streamline
- Gaskets
  - ☐ Compressor
  - ☐ Door
- ☐ Gasket Material
- ☐ Gasket Tackers
- ☐ Goggles
- ☐ Gauges, Service
- ☐ Hardware, Refrigerator
- ☐ Leak Detectors
- ☐ Lapping Compound and Materials
- ☐ Liquid Indicator
- ☐ Lubricating Oils
- ☐ Low Side Float Switches
- ☐ Low water
- ☐ Motors
- ☐ Needles, Float Valve
- ☐ Oil Return
- Packing
  - ☐ Fabric
  - ☐ Metallic
- ☐ Piston Pins
- ☐ Piston Rings
- ☐ Porcelain Refrigerator Cement
- ☐ Pumps, Circulating
- ☐ Receivers
- Recording Instruments
  - ☐ Humidity
  - ☐ Running Time
  - ☐ Temperature
- Refrigerants
  - ☐ Sulphur Dioxide
  - ☐ Methyl Chloride
  - ☐ Carrene
  - ☐ Freon
  - ☐ Iso Butane
  - ☐ Ethyl Chloride
- Refrigerator Dishes
  - ☐ Glass
  - ☐ Porcelain
- ☐ Safety Masks
- ☐ Seals, Shaft
- ☐ Resurfacing Stones
- Strainers
  - ☐ Expansion and Float Valve
  - ☐ Liquid Line
  - ☐ Suction Line
- Switches
  - ☐ Air Temperature
  - ☐ High Pressure Control
  - ☐ Low Pressure Control
  - ☐ Pressure
  - ☐ Temperature
- ☐ Mercury
- Thermostats
  - ☐ Air Temperature (Cooling)
  - ☐ Air Temperature (Heating)
  - ☐ Brine
  - ☐ Domestic Refrigeration
  - ☐ Industrial Refrigeration
- Thermometers
  - ☐ Refrigerator
  - ☐ Test
- ☐ Tool Chests
- Tools
  - ☐ Flaring
  - ☐ Pinchoff
  - ☐ Tube Bender
  - ☐ Tube Cutter
  - ☐ Wrench Sets
- ☐ Trap, Scale
- ☐ Trays, Ice Cube
- Tubing
  - ☐ Copper
  - ☐ Finned
  - ☐ Steel
  - ☐ Tinned
- ☐ Unit Blowers
- Valves
  - ☐ Automatic Expansion
  - ☐ By Pass
  - ☐ Check
  - ☐ Compressor
  - ☐ Expansion
  - ☐ Flapper
  - ☐ Magnetic
  - ☐ Pressure Reducing
  - ☐ Shutoff
  - ☐ Solenoid
  - ☐ Thermostatic Expansion
  - ☐ Two-Temperature
  - ☐ Water
- ☐ Valve Retainers
- ☐ Valve Stems

Write in Names of Products Not Listed

Name .....

Address .....

City and State .....

Business .....

Mail This Page to the

Refrigeration Service Engineer 433 N. Waller Ave., Chicago, Ill.

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to participate in
the activities of the

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Initiation Fee
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an educational engineering association to further the advancement of the refrigeration servicing profession.

This national organization of service men comprising the representative service men throughout the country is organized to serve its membership by keeping them currently informed on the advancement and developments in mechanical refrigeration.

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If you are actively engaged in this profession, identify yourself with the organization which represents your interests. We suggest you write to National Headquarters for complete information as to how this Society is serving its membership.

A Local Chapter . . .

in your city. The National Society will aid in the formation of a local chapter. Ten or more active service men are required to form a chapter. The National Society will assist.

NATIONAL HEADQUARTERS,
REFRIGERATION SERVICE ENGINEERS' SOCIETY,
433 N. Waller Ave., Chicago, Ill.

Check one or both
☐ Please send me information regarding membership in the Society.
☐ I would like to have further information as to the formation of a local chapter in my city.

Name .....

Address .....

City and State .....

Gas charged power element

Only "Genuine Detroit" Thermostatic Expansion Valves incorporate the advantages of the gas charged power element such as—

(1) Protection of motor against overload because suction pressure is definitely limited regardless of temperature.

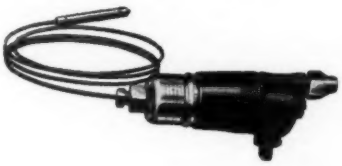
(2) Selection of a motor more efficient at full load because the gas charged power element limits overload in starting.

(3) Instant response because in the gas charged power element there is no temperature lag and no flood over when system is started.

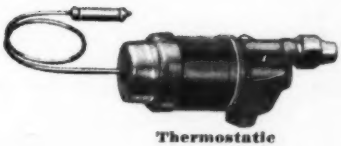
(4) Greater sensitivity because gas charged power element reacts more readily to temperature variations, assuring maximum efficiency of coil at all times.

Write for complete details for application to your jobs.

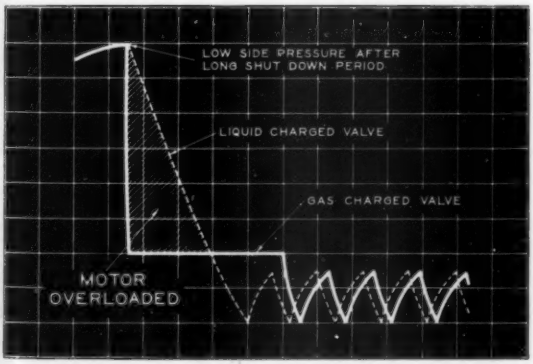
Thermostatic Expansion Valve No. 785 (GAS CHARGED)



Thermostatic Expansion Valve No. 673 (EITHER GAS OR LIQUID CHARGED)



Thermostatic Expansion Valve No. 674 (GAS CHARGED)



The chart at left shows comparative performance of the GAS CHARGED and Liquid Charged Valves during "Pull-down"

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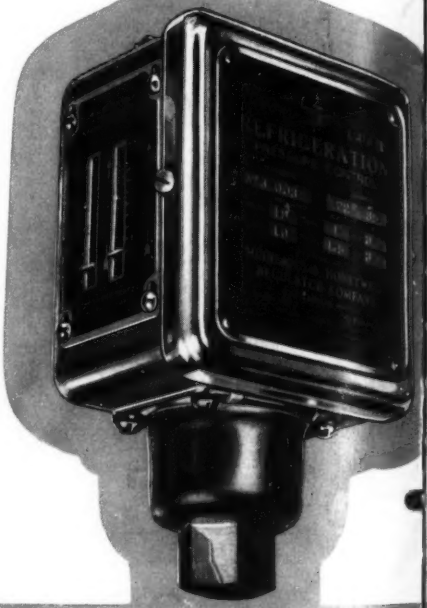

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